CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION
Fact Sheet No. 6 For Dairies

Evaluating Proposed Waste Holding Pond Sites

Introduction

The California Code of Regulations (Title 27, Subdivision 1, Chapter 7, Subchapter 2, Article 1, Section 22562d) requires that holding ponds utilized for animal wastes be lined with, or underlain by, soils which contain at least 10 percent clay and not more than 10 percent gravel or be lined with artificial materials of equivalent impermeability. In addition, the Tulare Basin Water Quality Control Plan and some county ordinances require a 5-foot separation between the bottom of a holding pond and the highest anticipated groundwater elevation. The following information is provided to assist dairy owners who want to construct a dairy waste holding pond and need to document that the pond meets the legal requirements.

Initial Assessments of Soils at Proposed Holding Pond Sites

An initial evaluation of soils at proposed holding pond locations can be made by using soil borings before the start of pond construction (see Fact Sheet No. 5 for Dairies). The borings can also provide information on expected depth to groundwater. Cuttings or cores from the borings can be examined by a geologist or soil scientist to assess soil type. If desired, soil samples from borings can be submitted for laboratory analysis to evaluate clay and gravel content.

For some proposed pond locations, observations or available information (such as a county soil survey) may indicate that soil will not meet the required clay and gravel limits. In such instances, no samples of native soil are collected, and the pond is constructed with a liner of imported soil that meets the required clay content. Samples of the completed liner should be collected and analyzed as described below to document that the required values are met.

Visual and Tactile Assessments of Soils in Pond Excavations

In most instances, clay and gravel content in the sides and bottom of holding ponds is evaluated by collecting samples from the pond excavation. The number and location of samples depends on site specific conditions as determined by visual and tactile assessment. The visual assessment documents soil appearance that indicates different soil types are present in the excavation. Tactile assessment refers to an evaluation of the soil "feel" when it is dry and wet. Such assessments when conducted by a trained or experienced person (i.e., a "qualified person") can indicate the presence of significant amounts of sand and clay. The results of the visual and tactile assessments should be documented as discussed below.

It is normal to find horizontal layers of soil with different properties. In most instances, the different layers have different appearances (color or structure) and/or a different "feel". A written description of the visual assessment and tactile assessment (i.e., feel of soil in the different layers) should be prepared. The written description should be supplemented by drawings as appropriate (see attached example). The drawing can be done by hand or computer. Photographs may also be used to document the visual assessment. Each significant layer should be assessed, and the description should focus on observations related to clay and gravel content. At least one composite sample of soil from each significant layer should be collected and analyzed as described below.

Collection of Soil Samples

Representative samples of soil in pond excavations should be collected and submitted for analysis of clay and gravel content. As previously noted, the number of samples will depend on the observed conditions in the pond excavation. If the pond excavation has homogenous soils in the sidewalls and bottom (an unusual condition), only one composite sample[1] may be adequate if the clay content is significantly greater than 10%. More often, several individual or composite samples are submitted in order to document uniformity and to assess each soil layer that appears to be different. Each composite sample may be composed of soil collected from several (3 to 10) locations within the excavation as long as the soil in each location appears to be essentially the same. Diagrams should be used to show the locations of the samples that were used to create each composite (see attached example). If the clay content is expected to be relatively low, more individual samples should be collected to assess spatial variability and minimum clay content in different locations.

When imported soil is used to create a pond liner, a composite sample of the constructed liner should be collected and analyzed. Any damage done to the liner as a result of sample collection should be repaired. If the liner does not cover the entire excavation (i.e., bottom and sidewalls), one or more composite samples of the exposed native material should also be collected. Again, diagrams should be used to show the locations of the samples that were used to create each composite.

Analysis of Soil Samples

The soil samples collected from the pond excavation should be submitted to a commercial laboratory for soil particle size analysis. When using a laboratory for the first time, it is desirable to review their qualifications and quality assurance / quality control (QA/QC) procedures. Although the focus is on clay and gravel content, the laboratory should be requested to also report the percentages of silt and sand in the sample; there will be little or no additional cost for such reporting. Most laboratories will also provide QA/QC information at no additional cost when reporting analytical results.

Groundwater Assessments

In locations where the county or regional board requires a 5-foot separation between the base of a holding pond and highest anticipated groundwater, documentation should be provided showing that the proposed pond location meets the criteria. Information on the depth to groundwater and historical fluctuations in groundwater elevations may be obtained from soil borings, wells, and/or from historical information provided by county or local agencies.

Presentation of Results

A report should be prepared presenting a summary of the visual and tactile soil assessments, a description of the soil sampling and compositing procedures, the reported analytical results, and relevant information on groundwater. Figures should be used to describe the observed soil conditions in the excavation and to identify the sample collection sites. Photographs may be used to supplement the figures. Reported analytical results should be summarized in tables and the laboratory reports should be included as an appendix. Groundwater information should be summarized relative to the pond construction. Relevant groundwater data should be included as an appendix.

---

[1] A composite soil sample is obtained by thoroughly mixing equal quantities (by weight or volume) of soil from two or more locations. For example, five 1-pound samples may be mixed in a 5-gallon pail, and a single 1-pound composite sample removed and sent for analysis. For holding pond site evaluations, composite samples are used only when the soil in each location appears to be essentially the same based on visual and tactile assessment. Composite samples should not be created from soil samples that have different appearances or feel.

EXAMPLE: HOLDING POND SITE ASSESSMENT

Nosuch Dairy
1234 Road Y, Pleasant, California

The pond location is shown on the attached map. The pond excavation was completed on 15 August 1998. As shown on the attached sketch, the pond excavation is approximately 200 feet by 500 feet by 17 feet deep. Some of the excavated soil was used to create a raised berm that is 5-feet high and 10-feet wide so that the finished pond with a 2 foot thick clay liner is approximately 20 feet deep. The remaining excavated soil was used in corrals.

An initial assessment of soil in the excavation indicated that there are five soil layers as shown on the attached sketch: The soil texture classifications are based on a visual and tactile assessment conducted by Mr. William Jones. Mr. Jones' business address, phone number, and qualifications for conducting soil assessments are attached. The five identified soil layers are:

1. A brown sandy loam to approximately 3 feet below grade
2. A dark brown sandy clay loam approximately 2 feet thick
3. A reddish-brown sandy loam approximately 4 feet thick
4. A hardpan (claypan) approximately 1 to 2 feet thick (see attached photograph)
5. Light brown loamy sand to the base of the excavation

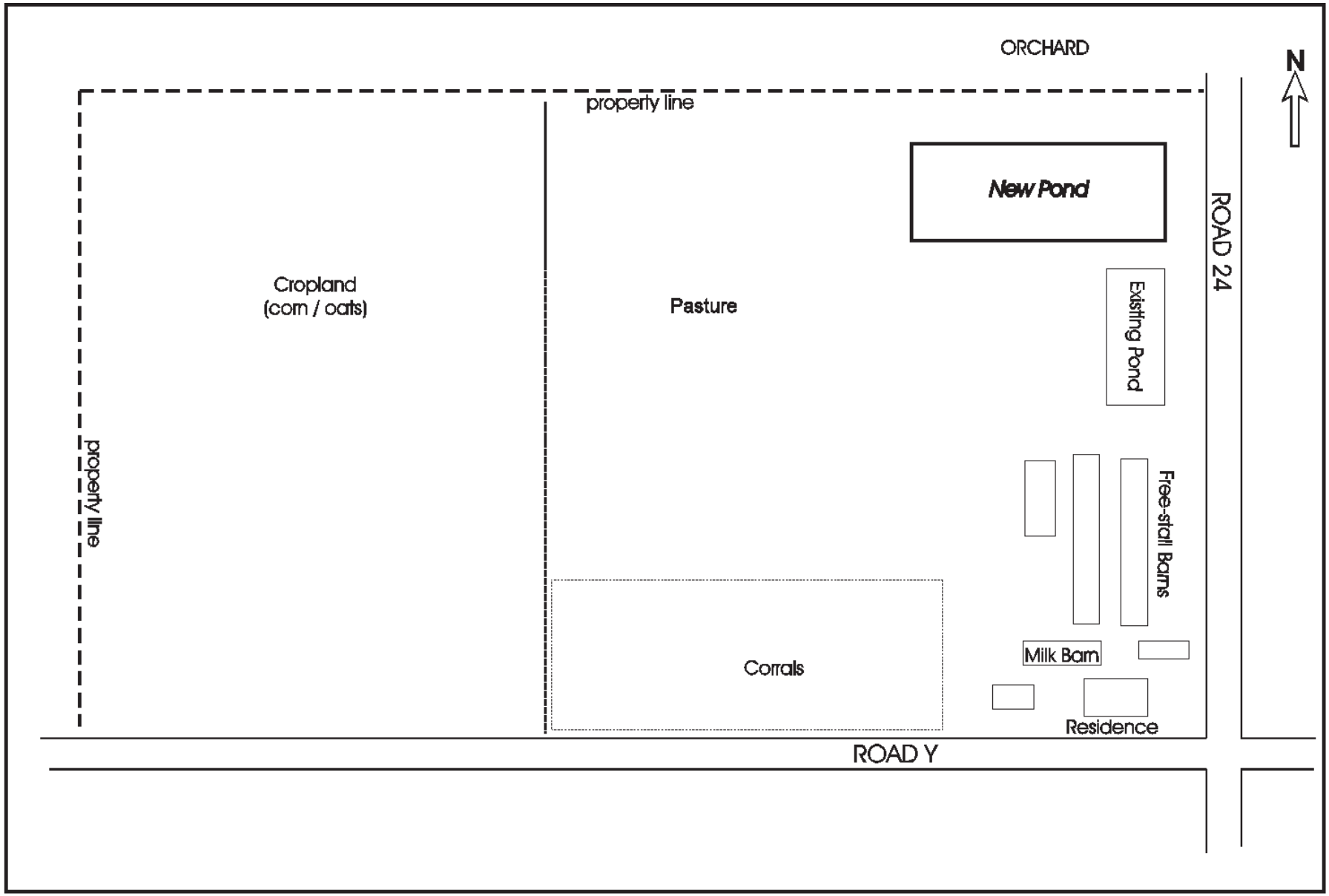
Based on the visual inspection of the soil, it was determined that a 2-foot thick liner consisting of imported clay soil would be placed in the bottom of the excavation and would extend approximately 6 feet up the sidewalls. The imported soil was obtained from McNoughts Soil Products in Ione, California. The liner was completed on September 2, 1998.

Three 1-pound composite soil samples from the excavation and liner were submitted to Z&Z Laboratories in Mercer California. The composites were made from 1-pound individual samples collected by excavating an area approximately 4" by 4" by 6" deep. The individual samples were composited by thoroughly mixing the individual samples in a plastic bucket and then removing a sample. The composite samples are described below:

Sample ID	Sample Description
S1	Composite of eight 1-pound soil samples of the first sandy loam layer (two from each sidewall and endwall) collected approximately 3 to 5feet below ground surface (bgs)
S2	Composite of eight 1-pound soil samples of the second sandy loam layer (two from each sidewall and endwall) collected approximately 8 to 11 feet bgs
L1	Composite of four 1-pound soil samples of the liner after placement (see sketch).

No samples of the sandy clay loam layer were collected because the layer had significantly more clay than the sandy loam layers that were above and below it. No samples of the hardpan or the loamy sand layer were collected because they were covered with the imported clay soil. The analytical results for the submitted samples are summarized below. The laboratory reports are attached. Available groundwater information (copy attached) indicates that the highest recorded local groundwater is approximately 10 feet below the base of the pond excavation.

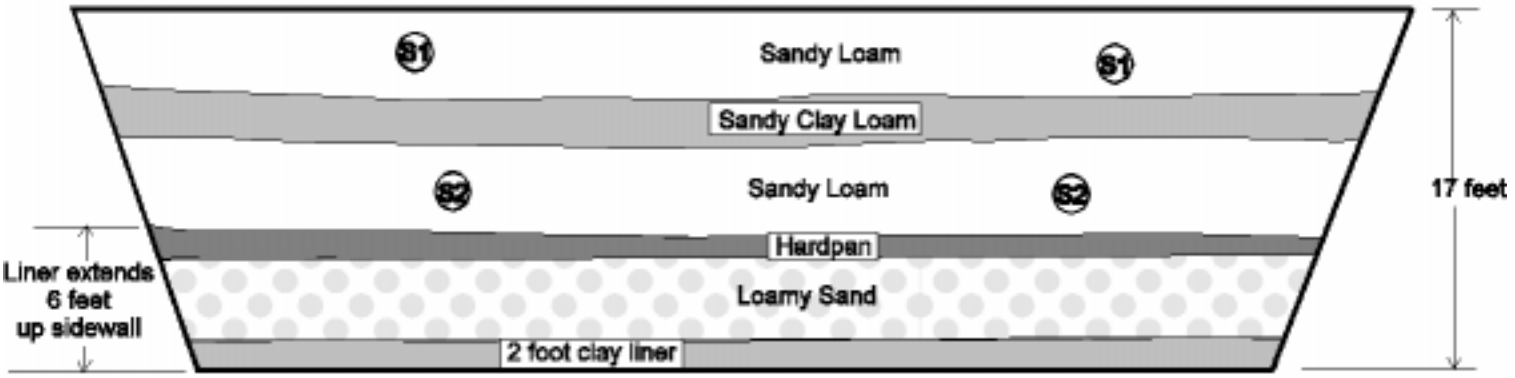
Sample ID	% Sand	% Silt	% Clay	Soil Texture
S1	63	24	13	Sandy Loam
S2	53	35	12	Sandy Loam
L1	22	28	50	Clay



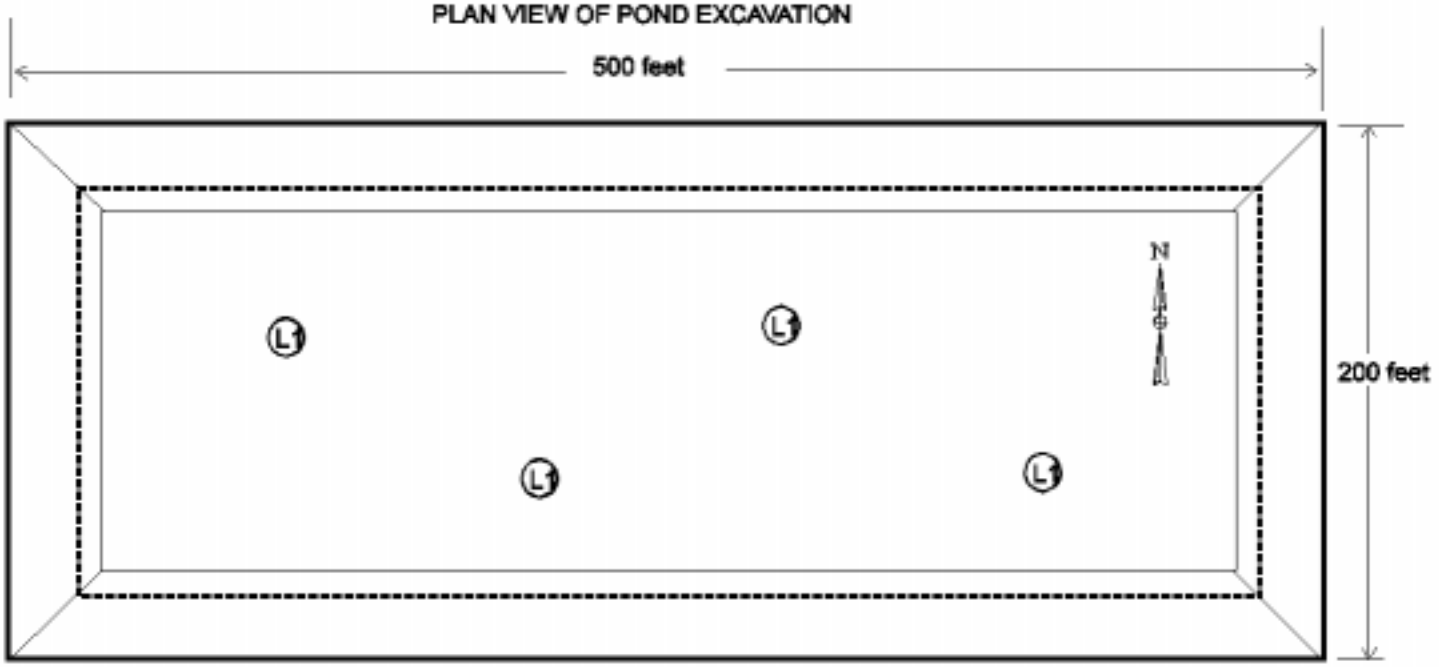
Nosuch Dairy
1234 Road Y
Pleasant, California

WASTEWATER HOLDING POND EXCAVATION
NOSUCH DAIRY
PLEASANT, CALIFORNIA

SOIL LAYERS IN POND EXCAVATION
TYPICAL SIDEWALL / ENDWALL VIEW (not to scale)



PLAN VIEW OF POND EXCAVATION



DRAWN BY W. JONES
SEPTEMBER 5, 1998